STLE 1991
COMBINED SUBJECT AND AUTHOR INDEX

Each paper published during the indexed period is assigned a sequence number, the first two digits of which indicate the year in which the paper was published. The index may be entered either through the Subject Index or the Author Index.

The Subject Index design has been revised, with keywords appearing in one of the following subject areas:

Bearings
Computing and Engineering Methods
Extreme Conditions Tribology
Friction
Human and Environmental
Lubricant Classes (by Application)
Lubricant Components
Lubricant Manufacture, Application and Disposal
Lubricant Properties and Problems
Lubrication Regimes
Maintenance and Condition Monitoring
Materials Properties and Tribology
Metalworking, Materials Machining
Seals
Surface Technology
Tribology of Equipment
Tribology in Industry
Wear and Failure

Inspection of the index will familiarize the user with the location of keywords. The sequence number of a paper appears next to the keywords which describe a significant part of the content of that paper.

The Author Index is an alphabetical listing of all authors of indexed papers, together with corresponding paper sequence numbers. Having determined the sequence numbers associated with a given subject or author, the papers to which these numbers refer may be found in the Chronological Listing. This Listing provides a complete reference for all papers published in 1991 issues of *Tribology Transactions* (**T34**) and *Lubrication Engineering* (**L47**), and in *Special Publication* **SP-31**, "Advances in Engineering Tribology," edited by Y-W. Chung and H. S. Cheng. The papers are listed by Authors(s), Title, Publication, Volume Number (bold type), Issue Number, and Page Numbers and are in order of ascending sequence number.

An excellent source of general information in the field of tribology is the *Handbook of Lubrication*, edited by E. R. Booser and published by CRC Press under the sponsorship of STLE.

1991 Chronological Listing

91001 **Gupta, P. K.**, "Modeling of Instabilities Induced by Cage Clearances in Cylindrical Roller Bearings," **T34**, 1, 1-8.

91002 **Lipschitz, A., Basu, P.** and **Johnson, R. P.**, "A Bi-Directional Gas Thrust Bearing," **T34**, 1, 9-16.

91003 **Liu, J. J., Zhang, X. H.** and **Zhu, B. L.**, "The Effect of a Soft Metallic Plated Layer on the Tribological Behavior of Steels Under Boundary Lubrication," **T34**, 1, 17-22.

91004 **Tung, S. C.** and **Wang, S. S.**, "Friction Reduction From Electrochemically Deposited Films," **T34**, 1, 23-34.

91005 **Vaidyanathan, K.** and **Keith, T. G. Jr.**, "Performance Characteristics of Cavitated Noncircular Journal Bearings in the Turbulent Flow Regime," **T34**, 1, 35-44.

91006 **Wang, S. S.** and **Tung, S. C.**, "A Reaction Mechanism for Producing Low-Friction Iron Phosphate Coatings," **T34**, 1, 45-50.

91007 **Yoshida, T.** and **Igarashi, J.**, "Consumption of Antioxidant of Turbine Oil in Service Unit," **T34**, 1, 51-58.

91008 **You, H. I.** and **Lu, S. S.**, "Effects of Fluid Inertia on the Operating Characteristics of a Cylinder-Plane Bearing," **T34**, 1, 59-62.

91009 **Bhargava, S. K.** and **Malik, M.**, "The Transient Response of a Journal in Plane Hydrodynamic Bearing with Flexible Damped Supports During Acceleration and Deceleration Periods," **T34**, 1, 63-69.

91010 **Braun, M. J., Canacci, V. A.** and **Hendricks, R. C.**, "Flow Visualization and Quantitative Velocity and Pressure Measurements in Simulated Single and Double Brush Seals," **T34**, 1, 70-80.

91011 **Curti, G., Raffa, F. A.** and **Vatta, F.**, "The Dynamic Stiffness Matrix Method in the Analysis of Rotating Systems," **T34**, 1, 81-85.

91012 **Furuhama, S., Suzuki, M., Ishikawa, H.** and **Watanabe, T.**, "The Primary Cause for Abnormal Wear in Diesel Engines with EGR Systems," **T34**, 1, 86-92.

91013 **Gupta, P. K.**, "Modeling of Instabilities Induced by Cage Clearances in Ball Bearings," **T34**, 1, 93-99.

91014 **Hashimoto, H.**, "The Effects of 'O-Type' Cavitation on the Performance Characteristics of Turbulent Journal Bearings," **T34**, 1, 100-106.

91015 **Kita, T.**, "The Influence of Aluminum Oxide Particles in Magnetic Coating on Head/Disk Wear," **T34**, 1, 107-111.

91016 **Rajalingham, C., Bhat, R. B.** and **Jha, V. K.**, "Stress Reversals in a Jeffcot Rotor Supported on Fluid Film Bearings," **T34**, 1, 112-116.

91017 **Rivera, M. P.**, "Bearing-Cage Frictional Instability—A Mechanical Model," **T34**, 1, 117-121.

91018 **Salant, R. F.** and **Blasbalg, D. A.**, "Dynamic Behavior of Two-Phase Mechanical Seals," **T34**, 1, 122-130.

91019 **Wang, J., Zhang, H. H.** and **Wang, S. H.**, "The Influence of Lubricant Visco-Plastic Character on the Line Contact EHL Under High Sliding Speeds," **T34**, 1, 131-137.

91020 **Yoshizaki, M., Naruse, C., Nemoto, R.** and **Haizuka, S.**, "Study on Frictional Loss of Spur Gears (Concerning the Influence of Tooth Form, Load, Tooth Surface Roughness, and Lubricating Oil)," **T34**, 1, 138-146.

91021 **Burton, R. A.**, "The Thermal Boundary Condition for High Speed Seal Flow," **T34**, 2, 155-160.

91022 **Chen, S. Y., Farris, T. N.** and **Chandrasekar, S.**, "Sliding Microindentation Fracture of Brittle Materials," **T34**, 2, 161-168.

91023 **Green, I.** and **Bair, S.**, "Dynamic Response to Axial Oscillation and Rotating Seat Runout in Contacting Mechanical Face Seals," **T34**, 2, 169-176.

91024 **Heshmat, H.**, "The Mechanism of Cavitation in Hydrodynamic Lubrication," **T34**, 2, 177-186.

91025 **Johnston, G. J., Wayte, R.** and **Spikes, H. A.**, "The Measurement and Study of Very Thin Lubricant Films in Concentrated Contacts," **T34**, 2, 187-194.

91026 **Lim, S. G., Prahl, J. M.** and **Brewe, D. E.**, "On the Numerical Solution of the Dynamically Loaded Hydrodynamic Lubrication of the Point Contact," **T34**, 2, 195-204.

91027 **Pierce, D. E., Burns, R. P., Dauplaise, H. M.** and **Mizerka, L. J.**, "Thermal Desorption Spectroscopy of Sputtered MoS_2 Films," **T34**, 2, 205-214.

91028 **Sakai, T., Murakami, T.** and **Yamamoto, Y.**, "Lubricating Performance of Organic Sulfides Under Repeated Rubbing Conditions. Part II: Effect of Additive Concentration," **T34**, 2, 215-222.

91029 **Shiomi, S., Itoh, M., Nakama, N., Tanoue, H., Koga, T.** and **Hirabayashi, H.**, "Gas Flow in a Thin Annulus, With Application to a Stern Tube Seal," **T34**, 2, 223-230.

91030 **Alvarez, G. A.**, "Analytical Solutions of the Elasticity Equations for Seals," **T34**, 2, 231-240.

91031 **Averbach, B. L.** and **Bamberger, E. N.**, "Analysis of Bearing Incidents in Aircraft Gas Turbine Mainshaft Bearings," **T34**, 2, 241-247.

91032 **Cann, P. M.** and **Spikes, H. A.**, "In Lubro Studies of Lubricants in EHD Contacts Using FTIR Absorption Spectroscopy," **T34**, 2, 248-256.

91033 **Gangopadhyay, A.** and **Jahanmir, S.**, "Friction and Wear Characteristics of Silicon Nitride-Graphite and Alumina-Graphite Composites," **T34**, 2, 257-265.

91034 **Komvopoulos, K.**, "Sliding Friction Mechanisms of Boundary-Lubricated Layered Surfaces: Part I—Basic Mechanical Aspects and Experimental Results," **T34**, 2, 266-280.

91035 **Komvopoulos, K.**, "Sliding Friction Mechanisms of Boundary-Lubricated Layered Surfaces: Part II—Theoretical Analysis," **T34**, 2, 281-291.

91036 **Tripp, H. A.** and **Melodick, T. E.**, "Steady Load Eccentricity Measurements in a Two Axial Groove Journal Bearing," **T34**, 2, 292-300.

91037 **Lucca, D. A.** and **Wright, R. N.**, "A Capacitance Technique for Investigating Viscous Shear in a Hydrodynamic Contact," **T34**, 2, 301-307.

91038 **Yu, S.** and **Rogers, R. J.**, "Estimation of Linearized Force Coefficients for Cylindrical Squeeze Films," **T34**, 2, 308-317.

91039 **Berther, T.** and **Davies, P.**, "Condition Monitoring of Check Valves in Reciprocating Pumps," **T34**, 3, 321-326.

91040 **Blanchet, T. A.** and **Kennedy, F. E. Jr.**, "Effects of Oscillatory Speed and Mutual Overlap on the Tribological Behavior of PTFE and Selected PTFE-based Self-Lubricating Composites," **T34**, 3, 327-334.

91041 **Blau, P. J.**, "Scale Effects in Steady-State Friction," **T34**, 3, 335-342.

91042 **Dunaevsky, V. V.**, "Prediction of Railroad Friction Braking Temperatures: Prediction of Average Bulk and Average Surface Temperatures of Railroad Wheels and Brake Discs," **T34**, 3, 343-352.

91043 **Harnoy, A.** and **Zhu, H.**, "The Role of the Elasticity of the Lubricant in Rotor Dynamics," **T34**, 3, 353-360.

91044 **Holzhauer, W.**, "Surface Changes Around Large Raceway Indentations During Run-In of Tapered Roller Bearings," **T34**, 3, 361-368.

91045 **Jiang, B. C., Liu, P. P.**, "Natural Lubrication and Wear of Textile Spinning Rings," **T34**, 3, 369-374.

91046 **Jung, S. Y., San Andres, L. A.** and **Vance, J. M.**, "Measurements of Pressure Distributions and Force Coefficients in a Squeeze Film Damper Part I: Fully Open Ended Configuration," **T34**, 3, 375-382.

91047 **Jung, S. Y., San Andres, L. A.** and **Vance, J. M.**, "Measurements of Pressure Distributions and Force Coefficients in a Squeeze Film Damper Part II: Partially Sealed Configuration," **T34**, 3, 383-388.

91048 **Rozeanu, L., Masyan, M.** and **Kennedy, F. E.**, "The Effect of Shear Rate on Viscosity of the Mineral Oil-HSB System," **T34**, 3, 389-397.

91049 **Wu, S.** and **Cheng, H. S.**, "A Friction Model of Partial-EHL Contacts and its Application to Power Loss in Spur Gears," **T34**, 3, 398-407.

91050 **Chang, T. P., Cheng, H. S., Chiou, W. A.** and **Sproul, W. D.**, "A Comparison of Fatigue Failure Morphology Between TiN Coated and Uncoated Lubricated Rollers," **T34**, 3, 408-416.

91051 **Gates, R. S.** and **Hsu, S. M.**, "Effect of Selected Chemical Compounds on the Lubrication of Silicon Nitride," **T34**, 3, 417-425.

91052 **Klaus, E. E., Duda, J. L.** and **Chao, K. K.**, "A Study of Wear Chemistry Using a Micro Sample Four-Ball Wear Test," **T34**, 3, 426-432.

91053 **Heshmat, H.**, "The Rheology and Hydrodynamics of Dry Powder Lubrication," **T34**, 3, 433-439.

91054 **Hoult, D. P.** and **Takiguchi, M.**, "Calibration of the Laser Fluorescence Technique Compared With Quantum Theory," **T34**, 3, 440-444.

91055 **Marscher, W. D.**, "Analysis and Test of Multistage Pump 'Wet' Critical Speeds," **T34**, 3, 445-457.

91056 **Ohmori, T., Kitamura, K., Danno, A.** and **Kawamura, M.**, "A Cold Forging Oil Containing Phosphorus Type EP Additives," **T34**, 3, 458-464.

91057 **Sinhasan, R., Sharma, S. C., Jain, S. C.**, "Performance Characteristics of Externally Pressurized Orifice Compensated Flexible Journal Bearing," **T34**, 3, 465-471.

91058 **Bhattacharya, R. S., Rai, A. K.** and **Aronov, V.**, "Co-Implantation of Mo^+ and S^+ in Al_2O_3 and ZrO_2 and Their Tribological Properties," **T34**, 3, 472-477.

91059 **Tung, S. C.** and **Wang, S. S.**, "In-Situ Electro-Charging for Friction Reduction and Wear Resistant Film Formation," **T34**, 4, 479-488.

91060 **Heshmat, H.** and **Walton, J. F.**, "Advanced Multi-Squeeze Film Dampers for Rotor Vibration Control," **T34**, 4, 489-496.

91061 **Yust, C. S.** and **DeVore, C. E.**, "The Friction and Wear of Lubricated Si_3N_4/SiC(w) Composites," **T34**, 4, 497-504.

91062 **Tichy, J.** and **Bou-Said, B.**, "Hydrodynamic Lubrication and Bearing Behavior with Impulsive Loads," **T34**, 4, 505-512.

91063 **Shimomura, T., Hirabayashi, H.** and **Nakajima, T.**, "A Study of the Relationship Between Frictional Characteristics and Surface Condition of Mechanical Face Seals," **T34**, 4, 513-520.

91064 **Lauer, J. L.** and **Dwyer, S. R.**, "Tribochemical Lubrication of Ceramics by Carbonaceous Vapors," **T34**, 4, 521-528.

91065 **Harangozo, A. V., Stolarski, T. A.** and **Gozdawa, T. J.**, "The Effect of Different Lubrication Methods on the Performance of a Tilting-Pad Journal Bearing," **T34**, 4, 529-536.

91066 **San Andres, L. A.**, "Effect of Eccentricity on the Force Response of a Hybrid Bearing," **T34**, 4, 537-544.

91067 **Benson, R. C.** and **Cole, K. A.**, "Transverse 'Runout' of a Nonflat Spinning Disk," **T34**, 4, 545-552.

91068 **Wayne, S. F., Buljan, S.-T., Baldoni, J. G.** and **Huckabee, M. L.**, "Microstructural Aspects of Si_3N_4-TiC Composites Affecting Abrasion and Erosion Resistance," **T34**, 4, 553-558.

91069 **Khanna, V. D.** and **Hendriks, F.**, "Programmable Air Bearing Sliders for Magnetic Storage," **T34**, 4, 559-564.

91070 **Nguyen, S. H.**, "Solution of Reynolds Equation With Slip-Flow Effects by a Hierarchical Finite Element Formulation," **T34**, 4, 565-568.

91071 **Davis, P.**, "Slider Vibration Amplitudes from White Light Interferometry," **T34**, 4, 569-572.

91072 **Eshel, A.**, "Simulation of Head Contour Effects in Helical Scan Video Recording," **T34**, 4, 573-576.

91073 **Ashby, M. F., Abulawi, J.** and **Kong, H. S.**, "Temperature Maps for Frictional Heating in Dry Sliding," **T34**, 4, 577-587.

91074 **Sadeghi, F.** and **McClung, W. D. Jr.**, "Formulas Used in Thermal Elastohydrodynamic Lubrication," **T34**, 4, 588-596.

91075 **Maher, J. F.** and **Adams, G. G.**, "Effect of Displacement-Dependent Membrane Stresses on the Axisymmetric Configuration of a Spinning Flexible Disk," **T34**, 4, 597-603.

91076 **Sorab, J.** and **Vanarsdale, W. E.**, "A Correlation for the Pressure and Temperature Dependence of Viscosity," **T34**, 4, 604-610.

91077 **Nau, B. S.** and **Leefe, S. E.**, "A Review of Some Aspects of the Prediction of Mechanical Seal Coning," **T34**, 4, 611-617.

91078 **Rabinowicz, E.** and **Kaymaram, F.**, "On the Mechanism of Failure of Particulate Rigid Disks," **T34**, 4, 618-622.

91079 **Prashad, H.**, "Theoretical Evaluation of Reduction in the Life of Hydrodynamic Journal Bearings Operating Under the Influence of Different Levels of Shaft Voltages," **T34**, 4, 623-627.

91080 **Esfahanian, M.** and **Hamrock, B. J.**, "Fluid-Film Lubrication Regimes Revisited," **T34**, 4, 628-632.

91081 **Rush, R. E.**, "Bearing Repair and Reconditioning," **L47**, 1, 10-14.

91082 **Bednarek, K.**, "Oil Pressure for the Hydrostatic Lubrication of a Hydrogenerator Thrust Bearing with Different Diameters of Lubrication Pockets in Tilting Pads," **L47**, 1, 17-20.

91083 **Law, A. B.** and **Lashen, E. S.**, "Microbicidal Efficacy of a Methylchloro-/Methylisothiazolone/Copper Preservative in Metalworking Fluids," **L47**, 1, 25-30.

91084 **Riddle, B. L., Kirk, T. E.** and **Kipp, E. M.**, "Reactive Additives Improve Aqueous Aluminum Foil Rolling," **L47**, 1, 41-45.

91085 **Hsu, S. M., Lim, D. S., Wang, Y. S.** and **Munro, R. G.**, "Ceramics Wear Maps: Concept and Method Development," **L47**, 1, 49-54.

91086 **Wang, Y. S., Hsu, S. M.** and **Munro, R. G.**, "Ceramics Wear Maps: Alumina," **L47**, 1, 63-69.

91087 **Ming, N.** and **Qiu, C.-W.**, "Ferrography for Evaluating Production Engines During Run-In and Durability Tests," **L47**, 2, 98-100.

91088 **Fenske, G. R., Erdemir, A., Erck, R. A., Cheng, C. C., Busch, D. E., Lee, R. H.** and **Nichols, F. A.**, "Ion-Assisted Deposition of High-Temperature Lubricous Surfaces," **L47**, 2, 104-111.

91089 **Bell, J. C.** and **Colgan, T.**, "Pivoted-follower Valve Train Wear: Criteria and Modelling," **L47**, 2, 114-121.

91090 **Lee, M.** and **Flom, D. G.**, "Lubrication Mechanisms in Tungsten and Molybdenum Wire Drawing. Part 1. Simulated Drawing Experiments," **L47**, 2, 127-132.

91091 **Lee, M.** and **Flom, D. G.**, "Lubrication Mechanisms in Tungsten and Molybdenum Wire Drawing. Part 2. Effects of Surface Conditions on Wetting and Lubricant Film Formation," **L47**, 2, 135-140.

91092 **Hombek, R., Januszkiewicz, K. R.** and **Sulek, H. H.**, "Thermal and Oxidative Stability of Non-Ionic Emulsifiers in the Presence of Aluminum at Elevated Temperatures," **L47**, 2, 143-148.

91093 **Quitmeyer, J.**, "New Technology Alkaline Cleaners Replace Chlorinated Solvent Degreasers," **L47**, 3, 162-165.

91094 **Erdemir, A.**, "Tribological Properties of Boric Acid and Boric-Acid-Forming Surfaces. Part I: Crystal Chemistry and Mechanism of Self-Lubrication of Boric Acid," **L47**, 3, 168-173.

91095 **Erdemir, A., Fenske, G. R., Erck, R. A., Nichols, F. A.** and **Busch, D. E.**, "Tribological Properties of Boric Acid and Boric-Acid-Forming Surfaces. Part II: Mechanisms of Formation and Self-Lubrication of Boric Acid Films on Boron- and Boric Oxide-Containing Surfaces," **L47**, 3, 179-184.

91096 **Movahed, B. Z.**, "An Investigation Into the Performance of Mechanical Face Seals," **L47**, 3, 189-190.

91097 **Komatsuzaki, S.** and **Homma, Y.**, "Antiseizure and Antiwear Properties of Lubricating Oils Under Refrigerant Gas Environments," **L47**, 3, 193-198.

91098 **Makki, J.** and **Graham, E. E.**, "Formation of Solid Films From the Vapor Phase on High Temperature Surfaces," **L47**, 3, 199-206.

91099 **Sen, A. K.** and **Kumar, R.**, "Oxidation Stability of Lubricants by Inverse Phase Gas Chromatography," **L47**, 3, 211-217.

91100 **Kushwaha, R. L.** and **Shi, J.**, "Investigation of Wear of Agricultural Tillage Tools," **L47**, 3, 219-222.

91101 **Burke, J. M.**, "Waste Treatment of Metalworking Fluids, A Comparison of Three Common Methods," **L47**, 4, 238-246.

91102 **Green, I.** and **Insolia, G.**, "Dynamic Modeling, Animation and Design of Non-Contacting Mechanical Face Seals," **L47**, 4, 253-260.

91103 **Papay, A. G.**, "Formulating Automatic Transmission Fluids," **L47**, 4, 271-275.

91104 **Godfrey, D.**, "More Tribology Basics," **L47**, 4, 282-283.

91105 **Tolfa, J. C.**, "Synthetic Lubricants Suitable for Use in Process and Hydrocarbon Gas Compressors," **L47**, 4, 289-295.

91106 **Dellacorte, C.** and **Sliney, H. E.**, "Tribological Properties of PM212: A High Temperature, Self-Lubricating, Powder Metallurgy Composite," **L47**, 4, 298-303.

91107 **Sliney, H. E.** and **Dellacorte, C.**, "A New Test Machine for Measuring Friction and Wear in Controlled Atmospheres to 1200°C," **L47**, 4, 314-319.

91108 **Manning, F. E.** and **Key, W. E.**, "A Novel Test Rig for Development of Mechanical Seals for Use in Hard Abrasive Slurries," **L47**, 4, 321-325.

91109 **Wei, R., Wilbur, P. J., Sampath, W. S., Williamson, D. L.** and **Wang, L.**, "Sliding Wear of Nitrogen Ion-Implanted Stainless Steels," **L47**, 4, 326-334.

91110 **Liu, W., Zhang, B., Huang, C., Zhang, X., Xue, Q.** and **Wang, H.**, "The Antiwear Properties of Potassium Borate as an Oil Additive," **L47**, 5, 344-347.

91111 **Lux, J. P., Hoult, D. P.** and **Olechowski, M. J.**, "Lubricant Film Thickness Measurements in a Diesel Engine Piston Ring Zone," **L47**, 5, 353-364.

91112 **Heinrich, J., Rosenfelder, O., Benker, W.** and **Schelter, H.**, "Aspects of Material and Design of Optimized Silicon Carbide Seal Rings," **L47**, 5, 367-372.

91113 **Marano, R. S., Cole, G. S.** and **Carduner, K. R.**, "Particulate in Cutting Fluids: Analysis and Implications in Machining Performance," **L47**, 5, 376-382.

91114 **Covitch, M. J., Graham, E. E., Marcsik, J. R.** and **Pucciani, A. J.**, "Laboratory Simulation of Diesel Piston Deposit Formation From Lubricants Delivered as a Mist," **L47**, 5, 397-403.

91115 **Hadley, J. W.** and **Blackhurst, P.**, "An Appraisal of the Ball-On-Cylinder Technique for Measuring Aviation Turbine Fuel Lubricity," **L47**, 5, 404-411.

91116 **Roby, S. H.**, "Investigation of Sequence IIIE Valve Train Wear Mechanisms," **L47**, 5, 413-422.

91117 **Barber, G. C., Matthews, J. J.** and **Jafry, S.**, "Wear and Scuff Resistance of Aluminum 390," **L47**, 5, 423-430.

91118 **Evans, W. A.**, "Spectrometric Oil Analysis: A Compliment to Ferrographic Analysis—A Case Study," **L47**, 6, 437-439.

91119 **Januszkiewicz, K. R., Hombek, R.** and **Sulek, H. H.**, "UV-Fluorescence Spectroscopic Method for Monitoring Tramp Oil Contamination in Hot Rolling Emulsions," **L47**, 6, 448-452.

91120 **Latto, B.** and **Yang, J.**, "Thermo-Oxidation Effect on Viscosity of 10W30 Oil with XM-5 or STP," **L47**, 6, 455-461.

91121 **Schödel, U. F.**, "Automatic Transmission Fluids (ATFs)—The Improvement of Low Temperature Characteristics," **L47**, 6, 463-467.

91122 **Alberola, N., Vassel, A., Bourgognon, H.** and **Rodes, C.**, "The Microcoking ELF/ECL Test - A New Lubricant Thermo-oxidation Test Based on Original Designs," **L47**, 6, 480-484.

91123 **Snyder, C. E. Jr., Paige, H. L.** and **Herrmann, D. K.**, "Correlation of Viscosity-Temperature Properties of Chlorofluorocarbons with Molecular Structure," **L47**, 6, 485-489.

91124 **Bowden, P. E.** and **Giffrow, M.**, "High Reliability Sealing of Slurries on Flue Gas Desulphurization Plants," **L47**, 6, 491-499.

91125 **Firko, H. T.** and **Burrell, R. E.**, "The Effects of Tetrazolium Salts on Bacterial Enumeration in Aluminum Hot Rolling Fluids," **L47**, 6, 505-508.

91126 **Harkness, D. M.**, "Solid-Film Prelubricants: Features and Benefits," **L47**, 7, 518-522.

91127 **Sasaki, A., Tobisu, T., Uchiyama, S.** and **Kawasaki, M.**, "GPC Analysis of Oil Insoluble Oxidation Products of Mineral Oil," **L47**, 7, 525-527.

91128 **Chen, Y. M., Rigaut, B.** and **Armanet, F.**, "Friction and Wear of Alumina Ceramics at High Sliding Speed," **L47**, 7, 531-537.

91129 **Heenan, D. F., Burrell, R. E., Hajcsar, E. E., Lauzon, D. C.** and **Dowdle, W. R.**, "Isothiazolone Microbiocide-Mediated Steel Corrosion and its Control in Aluminum Hot Rolling Emulsions," **L47**, 7, 545-548.

91130 **Hamai, K., Masuda, T., Goto, T.** and **Kai, S.**, "Development of a Friction Prediction Model for High Performance Engines," **L47**, 7, 567-573.

91131 **Tönshoff, H. K.** and **Wobker, H.-G.**, "Influence of Surface Integrity on the Wear of Ceramic Cutting Tools," **L47**, 7, 579-583.

91132 **Venier, C. G.** and **Casserly, E. W.**, "Multiply-Alkylated Cyclopentanes (MACs): A New Class of Synthesized Hydrocarbon Fluids," **L47**, 7, 586-591.

91133 **Landis, M. E.** and **Murphy, W. R.**, "Analysis of Lubricant Components Associated With Oxidative Color Degradation," **L47**, 7, 595-598.

91134 **Matteo, N. J.**, "Reconditioning of Rolling Element Bearings in Metal Forming Applications," **L47**, 8, 606-613.

91135 **Jen, C.-W.**, "Comparison of the Rotor Dynamic Coefficients of Packing and Mechanical Seals in Centrifugal Pumps," **L47**, 8, 616-619.

91136 **Etsion, I., Palmor, Z. J.** and **Harari, N.**, "Feasibility Study of a Controlled Mechanical Seal," **L47**, 8, 621-625.

91137 **Shiomi, S., Tsuboi, H., Ito, M., Tanoue, H., Koga, T., Hirabayashi, H.** and **Ura, A.**, "Observation of Dynamic Behavior of Segmented Seals on a Newly-Developed Stern Tube Seal," **L47**, 8, 632-638.

91138 **Erck, R. A.** and **Fenske, G. R.**, "Adhesion of Silver Films to Ion-Bombarded Zirconia," **L47**, 8, 640-644.

91139 **Booser, E. R.** and **Wilcock, D. F.**, "Hydrodynamic Lubrication," **L47**, 8, 645-647.

91140 **Sköld, R. O.**, "Field Testing of a Model Waterbased Metalworking Fluid Designed for Continuous Recycling Using Ultrafiltration," **L47**, 8, 653-659.

91141 **Bahadur, S.**, "Mechanical and Tribological Behavior of Polyester Reinforced With Short Fibers of Carbon and Aramid," **L47**, 8, 661-667.

91142 **Klaus, E. E., Duda, J. L.** and **Wu, W.-T.**, "Lubricated Wear of Silicon Nitride," **L47**, 8, 679-684.

91143 **Mahdi, S. M.** and **Sköld, R. O.**, "Ultrafiltration for the Recycling of a Model Water-based Metalworking Fluid: Process Design Considerations," **L47**, 8, 686-690.

91144 **Barnes, J. R.** and **Cannon, M. J.**, "Salicylate Technology for High-Performance Railroad Diesel Engine Lubricants," **L47**, 9, 701-707.

91145 **Bajaj, K. K.**, "Stray Mist - A Problem With Modern Oil Mist Systems?," **L47**, 9, 710-712.

91146 **Barnes, J. R.**, "Importance of Railroad Diesel Engine Oil TBN and its Relevance to LMOA Generation 5 for Salicylate Oils," **L47**, 9, 713-722.

91147 **Willingham, G. L.** and **Derbyshire, R. L.**, "Compatibility and Stabilization of Methylchloro/Methyl-Isothiazolone in Metalworking Fluids," **L47**, 9, 729-732.

91148 **Ezugwu, E. O., Machado, A. R., Pashby, I. R.** and **Wallbank, J.**, "The Effect of High-Pressure Coolant Supply When Machining a Heat-Resistant Nickel-Based Superalloy," **L47**, 9, 751-757.

91149 **Melley, R. E.**, "Lubrication Research in a Support Role to Mine Operations," **L47**, 9, 763-771.

91150 **Tönshoff, H. K.** and **Denkena, B.**, "Wear of Ceramic Tools in Milling," **L47**, 9, 772-778.

91151 **Fenske, G. R., Hu, R., Baldo, P. M., Erck, R. A., Erdemir, A., Lee, R. H., Busch, D. E., Nichols, F. A.** and **Rehn, L. E.**, "Ion-Beam Mixing of Fe/B Layers for Tribological Applications," **L47**, 9, 779-786.

91152 **Rush, R. E.**, "Technological Changes in Steel Mill Crane Lubrication," **L47**, 10, 796-800.

91153 **Sasaki, A., Tobisu, T., Uchiyama, S., Sakai, T.** and **Kawasaki, M.**, "Evaluation of Molecular Weight and Solubility in Oil of the Oxidation Products of Two Different Types of Oils," **L47**, 10, 809-813.

91154 **Gupta, V. K., Warren, O. L.** and **Eisentraut, K. J.**, "Interaction of Metals With Chlorotrifluoroethylene Fluid at Elevated Temperatures," **L47**, 10, 816-821.

91155 **Zang, Z.-Y.** and **Han, X.-A.**, "A Study on Boundary Lubrication of Cold Rolling Oil," **L47**, 10, 823-829.

91156 **Jackson, A.**, "Elastohydrodynamic Lubrication (EHL)," **L47**, 10, 833-835.

91157 **Averbach, B. L., Van Pelt, S. G., Pearson, P. K.** and **Bamberger, E. N.**, "Surface-Initiated Spalling Fatigue in M-50 and M-50 NiL Bearings," **L47**, 10, 837-843.

91158 **Uchibori, Z., Miyazawa, M., Komiya, M., Tanoue, H., Hirabayashi, H.** and **Kaneta, M.**, "Fundamental Study of the Carbon Blister Generation at the Starting Period on Mechanical Seals," **L47**, 10, 847-858.

91159 **Erdemir, A., Busch, D. E., Erck, R. A., Fenske, G. R.** and **Lee, R. H.**, "Ion-Beam-Assisted Deposition of Silver Films on Zirconia Ceramics for Improved Tribological Behavior," **L47**, 10, 863-872.

91160 **Sachs, N. W.**, "What Does 'PM' Really Mean? Preventive vs Predictive Maintenance," **L47**, 11, 889-891.

91161 **Benchaita, M. T.**, "Valve Train Wear Mechanisms and Lubricant Performance in New Gasoline Engines," **L47**, 11, 893-902.

91162 **Bonham, C. D.** and **Dellacorte, C.**, "The Application of a Computer Data Acquisition System to a New High Temperature Tribometer," **L47**, 11, 907-923.

91163 **Kusai, S.**, "Polyethers as Base Fluids to Formulate High Performance Lubricants," **L47**, 11, 926-933.

91164 **Gschwender, L. J., Snyder, C. E. Jr., Fultz, G. W.** and **Chen, L. S.**, "Synthesis and Characterization of a High-Temperature, Low-Volatility Phosphate Additive for Aerospace Applications," **L47**, 11, 935-938.

91165 **Hiltz, J. A.** and **Haggett, R. D.**, "Identification and Quantitative Analysis of Contaminants in Lubricating and Hydraulic Fluids by Gas Chromatography/Mass Spectrometry," **L47**, 11, 945-954.

91166 **Brown, T. O., Hildebrant, K. A.** and **Slack, D. A.**, "Development of an Improved Open Gear Lubricant," **L47**, 11, 957-963.

91167 **Sachs, N. W.**, "Metal Fatigue," **L47**, 12, 977-981.

91168 **Riddle, B. L.** and **Kipp, E. M.**, "Friction and Wear Properties of PEG Esters in the Presence of a Complex Phosphate Ester," **L47**, 12, 991-995.

91169 **Fein, R. S.**, "Boundary Lubrication," **L47**, 12, 1005-1008.

91170 **Wedeven, L. D.** and **Miller, N. C.**, "Material and Tribological Considerations for Turbopump Bearings," **L47**, 12, 1009-1017.

91171 **Komatsuzaki, S., Homma, Y., Kawashima, K.** and **Itoh, Y.**, "Polyalkylene Glycol as Lubricant for HFC-134a Compressors," **L47**, 12, 1018-1025.

91172 **Gupta, V. K.** and **Eisentraut, K. J.**, "Interaction of Alloys With Chlorotrifluoroethylene Fluid at 177°C," **L47**, 12, 1028-1034.

91173 **Groeneweg, M., Hakim, N., Barber, G. C.** and **Klaus, E. E.**, "Vapor Delivered Lubrication of Diesel Engines—Cylinder Kit Rig Simulation," **L47**, 12, 1035-1039.

91174 **Miyoshi, K.**, "Uses of Auger and X-ray Photoelectron Spectroscopy in the Study of Adhesion and Friction," **SP-31**, 3-12.

91175 **Peebles, D. E.** and **Pope, L. E.**, "Use of Electron Spectroscopies in the Tribological Evaluation of Diamond Films," **SP-31**, 13-30.

91176 **Hilton, M. R., Bauer, R., Didziulis, S. V., Lince, J. R.** and **Fleischauer, P. D.**, "Structural, Chemical, and Tribological Studies of Sputter-Deposited MoS_2 Solid Lubricant Films," **SP-31**, 31-42.

91177 **Dugger, M. T., Wahl, K. J., Chung, Y.-W., Bhushan, B.** and **Rothschild, W.**, "An Investigation of Environmental Effects on the Wear and Surface Composition of Thin Film Magnetic Disks," **SP-31**, 43-53.

91178 **Hahn, G. T.** and **Rubin, C. A.**, "Elastoplastic Analysis of Repeated Rolling and Sliding Contact," **SP-31**, 55-70.

91179 **Murakami, Y., Sakae, C., Ichimaru, K.** and **Kaneta, M.**, "Elastic-Plastic Analysis of Subsurface Layer Under Cyclic Rolling-Sliding Contact Loading and Pit Formation Mechanism," **SP-31**, 71-88.

91180 **Moyer, C. A.**, "The Status and Future of Roller Bearing Life Prediction," **SP-31**, 89-99.

91181 **Kennedy, F. E. Jr., Lee, P. H., Feehan, J. P.** and **Collier, J. P.**, "Failure of UHMWPE Polymers Surfaces of Knee Prostheses: A Rolling/Sliding Contact," **SP-31**, 100-109.

91182 **Eberhardt, A. W.** and **Keer, L. M.**, "Normal and Tangential Contact of Thin Layered Spheres," **SP-31**, 110-121.

91183 **Hsu, S. M., Lacey, P. I., Wang, Y. S.** and **Lee, S. W.**, "Wear Mechanism Maps of Ceramics," **SP-31**, 123-132.

91184 **Braza, J. F.** and **Braza, P. A.**, "Examination of Silicon Nitride in Lubricated Sliding Wear Tests," **SP-31**, 133-144.

91185 **Page, R. A., Lankford, J.** and **Blanchard, C. R.**, "Development of Self Lubricating Ceramics Using Surface and Bulk Oxidizing Species," **SP-31**, 145-150.

91186 **Fine, M. E.**, "Ceramic and Metal Matrix Composites for Tribological Applications," **SP-31**, 151-162.

91187 **Wedeven, L. D.**, "Thin Film Lubrication and Tribological Simulation," **SP-31**, 164-184.

91188 **Hamrock, B. J.**, "Film Collapse and Subsurface Stresses in EHL and Micro-EHL," **SP-31**, 185-196.

91189 **Nakahara, T., Matumoto, H., Kyogoku, K., Nakamura, M.** and **Yasuda, Y.**, "Friction Characteristics in Contra-Rotating Rollers," **SP-31**, 197-205.

91190 **Shen, M. C., Cheng, H. S.** and **Lee, S. C.**, "Thin Film Lubrication Breakdown in Conformal and Concentrated Contacts," **SP-31**, 206-214.

91191 **Snyder, C. E. Jr.** and **Gschwender, L. J.**, "Perfluoropolyalkylethers - Liquid Lubricants of the Future?," **SP-31**, 216-229.

91192 **Dekoven, B. M.** and **Mitchell, G. E.**, "Surface Chemistry and In-Situ Friction Studies of Thin Polyphenyl Ether (5P-4E) Films on Clean and Oxidized M-50 Steel Surfaces," **SP-31**, 230-241.

1991 Subject Index

Bearings

Air, Gas 91002, 91069, 91070, 91071, 91075
Hydrodynamic
  Journal 91005, 91036, 91043, 91057, 91065, 91079, 91139
  Tilting-Pad 91065, 91082
Hydrostatic 91066
Rolling Element 91080, 91081, 91134, 91178, 91180
  Ball 91013, 91031, 91149, 91157, 91168, 91184
  Cylindrical Roller 91001, 91031
  Tapered Roller 91044

Computing and Engineering Methods

Contact Mechanics 91035, 91044, 91063, 91178, 91179, 91182
Data Acquisition 91162
Dynamic Modelling 91001, 91009, 91011, 91013, 91016, 91017, 91018, 91023, 91026, 91038, 91043, 91055, 91057, 91062, 91067, 91102
Fluid Mechanics 91005, 91008, 91009, 91014, 91019, 91021, 91043, 91057, 91062, 91072, 91188
Heat Transfer Analysis 91018, 91021, 91042, 91073, 91077
Stress Analysis 91022, 91182
see also Lubrication Regimes

Extreme Conditions Tribology

High Speed 91031
High Temperature 91031, 91107, 91162, 91164, 91191
Particulate Contamination 91108, 91113

Friction

Boundary Lubrication 91003, 91004, 91006, 91017,91028, 91034, 91035, 91051,91052,91059,91061,91063,91064,91090,91097,91115,91130, 91155, 91158, 91167, 91169, 91171
EHL (Traction) 91019, 91020, 91049, 91112, 91130, 91156, 91163, 91187
Hydrodynamic Lubrication 91005, 91065, 91130
Mechanisms 91041, 91094, 91095, 91130
Rolling 91049
Self Lubrication 91033, 91040, 91041
Solid Lubrication 91015, 91053, 91094, 91095, 91106
Stick-Slip 91155
Testing
  Bench Tests 91097, 91107, 91155, 91158, 91162, 91171, 91189
  Equipment Tests 91108
Unlubricated 91058, 91061, 91073, 91078, 91109, 91128, 91141, 91151, 91159, 91170, 91174, 91175, 91176, 91177, 91183, 91185, 91187

Human and Environmental

Biolubrication—*see* Lubrication Regimes
Conservation
  Materials 91081, 91134
Pollution 91124
Recycling 91140, 91143
Safety 91145
Toxicology 91093
Waste 91093, 91101

Lubricant Classes (by Application)

Automatic Transmission Fluids 91103, 91121
Compressor Oils 91105, 91171
Gas Turbine Oils 91007, 91133
Gear Lubricants 91020, 91166
Greases 91166
Hydraulic Fluids 91123, 91127, 91165, 91184
Internal Combustion Engine Oils
Diesel Engines 91111, 91114, , 91122, 91144, 91146, 91165, 91173
Gasoline Engines 91004, 91006, 91054, 91087, 91116, 91120, 91122, 91130
Metalworking Fluids, Coolants 91083, 91101, 91140, 91143, 91147, 91168
Cutting Fluids 91113, 91148
Drawing Oils 91090, 91091
Forging Oils 91056
Grinding Fluids 91140
Rolling Oils 91084, 91092, 91119, 91125, 91129, 91155
Process Fluids 91126
Refrigeration Oils 91097
Steam Turbine Oils 91007, 91133
Vapor Phase Lubricants 91064, 91098, 91173

Lubricant Components

Additives
Antimicrobial 91083, 91125, 91129, 91147
Antioxidant 91007, 91099, 91103, 91120, 91153
Antiwear 91003, 91006, 91020, 91051, 91058, 91084, 91103, 91110, 91116, 91161, 91164, 91169
Corrosion Inhibitor 91103
Detergent/Dispersant 91103, 91121, 91168
Emulsifiers/Demulsifiers 91092, 91168
Extreme Pressure 91020, 91028, 91056, 91084, 91110, 91169
Foam Control 91103
Friction Modifying 91090, 91091, 91103, 91169
Solid Lubricant 91090, 91091, 91098, 91176
VI Improver 91048, 91103, 91189
Solid Lubricants
Molybdenum Disulfide 91027, 91058
Synthetic Basestocks
Fluorocarbons 91105, 91123, 91154, 91172, 91187, 91191
Hydrocarbons 91020, 91105, 91132
Organic Esters 91187
Polyethers 91163, 91192
Polyglycols 91020, 91105, 91142, 91171
Silicones 91105

Lubricant Manufacture, Application and Disposal

Application Method
Grease Application 91152
Mist 91145
Oil Bath 91090
Vapor Phase 91064, 91098, 91173
Cleanup, Solvents 91093
Disposal 91101

Lubricant Properties and Problems

Acidity, Basicity 91144, 91146
Additive Deposition—*see* Surface Technology
Contamination
Incompatible Fluids 91165
Particulates 91113, 91118
Water 91012
Demulsibility, Emulsivity 91092
Electrical Properties 91004, 91006, 91037, 91059, 91079
Lubricant Degradation
Microbial 91083, 91125, 91140, 91143, 91147
Oxidation 91007, 91051, 91099, 91114, 91120, 91122, 91127, 91133, 91153, 91163, 91164, 91171, 91191
Thermal 91114, 91120, 91122, 91133, 91154, 91163, 91164, 91171, 91172, 91191
Rheology
Non-Newtonian Behavior 91048
Pour Point 91132
Viscosity 91048, 91076, 91120, 91121, 91123, 91132, 91163, 91192
Viscosity-Pressure 91025, 91076
Viscosity-Temperature 91076
see also Maintenance

Lubrication Regimes

Biolubrication 91181
Boundary Lubrication
Chemistry 91004, 91104
Friction—*see* Friction
Wear—*see* Wear
Elastohydrodynamic Lubrication (EHL)
Film Geometry 91025, 91026, 91074, 91080, 91089, 91104, 91156, 91166, 91187, 91188
Grease Lubricated 91032, 91156
Low Elastic Modulus EHL 91080
Micro-EHL 91187, 91188
Non-Newtonian Lubricants 91019, 91189
Partial-EHL, Roughness Effects 91049, 91050, 91156, 91157, 91189
Thermal Effects 91019, 91074
Traction—*see* Friction
Hydrodynamic and Hydrostatic Lubrication
Cavitation 91005, 91008, 91014, 91024, 91046, 91047, 91060, 91139
Film Geometry 91005, 91024, 91036, 91037, 91054, 91057, 91071, 91075, 91104, 91111, 91139, 91157
Flow Rate 91008, 91065, 91066, 91111, 91139
Friction—*see* Friction
Gas and Vapor Lubricated 91002
Inertia Effects 91008, 91046, 91047, 91066
Load-Carrying Capacity 91002, 91005, 91008, 91066, 91070, 91082
Non-Newtonian Lubricants 91043
Squeeze-Film 91038, 91046, 91047, 91060, 91062
Stability, Vibration 91009, 91016, 91066
Starvation 91024
Thermal Effects 91024, 91037, 91065, 91079, 91139
Turbulent 91005, 91014
Self Lubrication 91185
Solid Lubrication
Friction—*see* Friction
Mechanisms 91053, 91094, 91095, 91104
Vapor Phase Lubrication 91064, 91098, 91173

Maintenance and Condition Monitoring

Equipment Monitoring 91039, 91118, 91160
Failure Analysis 91096
Filtration, Cleanliness 91140, 91143, 91152
Life Prediction Methods 91180
Lubricant Analytical Techniques
Ferrography 91087, 91118, 91160
Fluorescence 91054, 91111, 91119
Gas Chromatography 91092, 91099, 91119, 91127, 91153, 91154, 91155, 91172
Liquid Chromatography 91083, 91092, 91119, 91133
NMR 91056
Spectroscopy 91032, 91120, 91160
TGA 91027
see also Lubricant Properties
Maintenance 91081, 91160
see also Wear and Failure

Materials Properties and Tribology

Ceramics 91022
Carbides 91061, 91064, 91068, 91078, 91085, 91098, 91112, 91170, 91174, 91183, 91185
Composite 91033, 91061, 91078, 91186
Nitrides 91033, 91051, 91061, 91068, 91073, 91085, 91098, 91131, 91142, 91150, 91170, 91183, 91184, 91185
Oxides 91058, 91064, 91073, 91078, 91085, 91086, 91128, 91131, 91138, 91159, 91174, 91177, 91183, 91185
Diamond 91175
Elastomeric 91040
Ferrous Alloys, Steel 91034, 91073, 91109, 91148, 91172
Glass 91022
Metals, Elemental
Aluminum 91015, 91034, 91058, 91113, 91117, 91125, 91129, 91154
Chromium 91154, 91157, 91170
Cobalt 91154
Copper 91003, 91083, 91154
Iron 91154
Lead 91003
Nickel 91148, 91154
Silver 91138, 91159
Tin 91003, 91154
Titanium 91034, 91050, 91170
Tungsten 91154
Non-Ferrous Alloys 91073, 91172, 91177
Polymeric 91040, 91141, 91181
Powder Metals 91106
Self-Lubricating
Carbon, Graphite 91158
Polymeric 91040, 91152

Metalworking, Materials Machining

Coolants—*see* Lubricant Classes
Cutting 91113, 91131
Milling 91150
Turning 91148

Finishing
Grinding 91140
Forming 91126
Drawing, Extruding 91037, 91090, 91091, 91126
Forging 91056
Rolling 91084, 91092, 91119, 91125

Seals

Reciprocating Seals
Piston Rings 91004, 91006, 91054, 91111, 91114
Rotary Seals
Brush 91010
Face 91021, 91023, 91063, 91096, 91102, 91112, 91124, 91136, 91158
Lip 91029, 91030, 91137
Mechanical 91077, 91102, 91108, 91135, 91158
Packing 91135, 91149
Two-Phase 91018

Surface Technology

Chemical Analytical Techniques
AES(Auger) 91064, 91174, 91175
EDXRF 91113
EELS 91175, 91192
EPMA 91028
EXAFS 91176
FTIR 91032
Raman 91033, 91064, 91095
RBS 91058
TDS 91027
XPS 91027, 91174, 91175, 91176, 91177, 91192
XRD 91004, 91113, 91128, 91176
Coatings and Films
Additive-Deposited Films 91004, 91006, 91032, 91059
Friction-Reducing Coatings 91004, 91006, 91027, 91059, 91088, 91138, 91159, 91175, 91176, 91182
Wear-Resistant Coatings 91088, 91138, 91151, 91157, 91159, 91170, 91175, 91176, 91182
Metallurgical Analysis 91050, 91116, 91117, 91167
Physical Examination Methods
Optical Microscopy 91022
SEM 91031, 91044, 91050, 91098, 91113, 91116, 91176
TEM 91050, 91058, 91088, 91176
Surface Modification
Ion Implantation 91109, 91138, 91151, 91159
see also Metalworking
Surface Roughness
Analysis and Models 91063, 91158
Running-In 91044

Tribology of Equipment

Bearings—*see* Bearings
Brakes 91042
Cams 91089, 91116, 91130, 91161, 91189
Compressors (Gas) 91105
Refrigerant 91171
Dampers 91046, 91047, 91060
Gas Turbines
Aviation Jets 91031, 91115, 91157, 91164
Industrial 91007
Gears
Open Gears 91166
Spur Gears 91020, 91049
Hydraulic Components
Centrifugal Pumps, Motors 91055, 91135
Piston Pumps, Motors 91039, 91152
Seals—*see* Seals
Valves 91039
Vane Pumps, Motors 91152
Internal Combustion Engines 91004, 91006, 91054, 91087, 91089
Diesel 91012, 91111, 91114, 91144, 91146, 91173
Gasoline 91116, 91120, 91130, 91161
Machine Tools 91150
Magnetic Data Storage Systems
Floppy Discs 91067, 91075
Hard Discs 91015, 91067, 91069, 91078, 91177
Heads 91015, 91069, 91070, 91071, 91072, 91078
Tapes 91072
Rocket Motors 91170
Seals—*see* Seals
Steam Turbines 91007

Tribology in Industry

Aerospace
Airplanes 91031, 91115, 91157, 91164
Space Vehicles 91170
Agriculture 91100
Aluminum 91084, 91092, 91125, 91129, 91134
Automotive 91004, 91006, 91012, 91087, 91089, 91111, 91114, 91116, 91130, 91161
Cement 91166
Magnetic Data Storage 91015, 91067, 91069, 91070, 91071, 91072, 91075, 91078, 91177
Metalworking—*see* Metalworking
Marine 91029, 91137
Mining 91149, 91166
Oil Production 91149
Power Generation 91007
Fossil Fuel 91124
Hydroelectric 91082
Railroad
Vehicles 91042, 91144, 91146
Steel 91081, 91126, 91134, 91152, 91155
Textiles 91045

Wear and Failure

Fatigue
Crack Propagation 91022
Non-contact 91167
Rolling-contact 91031, 91044, 91050, 91116, 91157, 91161, 91167, 91170, 91178, 91179, 91180, 91181
Galling 91056, 91109
Scoring, Scuffing 91003, 91115, 91117, 91161, 91188, 91191
Wear
Boundary Lubricated 91001, 91013, 91028, 91051, 91052, 91059, 91061, 91063, 91064, 91084, 91085, 91086, 91089, 91097,91098, 91110, 91115, 91142, 91164, 91167, 91169, 91171, 91181, 91184, 91186, 91192
Self-Lubricated 91033, 91040
Solid-Lubricated 91106
Unlubricated 91045, 91058, 91061, 91078, 91085, 91086, 91109, 91128, 91131, 91142, 91151, 91159, 91175, 91176, 91177, 91183, 91185
Wear Mechanisms
Abrasive 91015, 91022, 91068, 91100, 91113, 91116, 91117, 91124, 91161, 91183
Adhesive 91015, 91078, 91109, 91115
Corrosive 91012
Delamination 91181
Erosive 91068
Oxidative 91045, 91115, 91117, 91161
Wear Particle Analysis 91087, 91108, 91113, 91118, 91160
Wear/Failure Testing Devices
Bench Tests 91100, 91107, 91109, 91115, 91162, 91173, 91181, 91184, 91190, 91192
Equipment Tests 91108
see also Maintenance

1991 Author Index

A

Abulawi, J. 91073
Adams, G. G. 91075
Alberola, N. 91122
Alvarez, G. A. 91030
Armanet, F. 91128
Aronov, V. 91058
Ashby, M. F. 91073
Averbach, B. L. 91031, 91157

B

Bahadur, S. 91141
Bair, S. 91023
Bajaj, K. K. 91145
Baldo, P. M. 91151
Baldoni, J. G. 91068
Bamberger, E. N. 91031, 91157
Barber, G. C. 91117, 91173
Barnes, J. R. 91144, 91146
Basu, P. 91002
Bauer, R. 91176
Bednarek, K. 91082
Bell, J. C. 91089
Benchaita, M. T. 91161
Benker, W. 91112
Benson, R. C. 91067
Berther, T. 91039
Bhargava, S. K. 91009
Bhat, R. B. 91016

Bhattacharya, R. S. 91058
Bhushan, B. 91177
Blackhurst, P. 91115
Blanchard, C. R. 91185
Blanchet, T. A. 91040
Blasbalg, D. A. 91018
Blau, P. J. 91041
Bonham, C. D. 91162
Booser, E. R. 91139
Bourgognon, H. 91122
Bou-Saïd, B. 91062
Bowden, P. E. 91124
Braun, M. J. 91010
Braza, J. F. 91184
Braza, P. A. 91184
Brewe, D. E. 91026
Brown, T. O. 91166
Buljan, S-T. 91068
Burke, J. M. 91101
Burns, R. P. 91027
Burrell, R. E. 91125, 91129
Burton, R. A. 91021
Busch, D. E. 91088, 91095, 91151, 91159

C

Canacci, V. A. 91010
Cann, P. M. 91032
Cannon, M. J. 91144
Carduner, K. R. 91113
Casserly, E. W. 91132
Chandrasekar, S. 91022
Chang, T. P. 91050
Chao, K. K. 91052
Chen, L. S. 91164
Chen, S. Y. 91022
Chen, Y. M. 91128
Cheng, C. C. 91088
Cheng, H. S. 91049, 91050, 91190
Chiou, W. A. 91050
Chung, Y-W. 91177
Cole, G. S. 91113
Cole, K. A. 91067
Colgan, T. 91089
Collier, J. P. 91181
Covitch, M. J. 91114
Curti, G. 91011

D

Danno, A. 91056
Dauplaise, H. M. 91027
Davies, P. 91039
Davis, P. 91071
Dekoven, B. M. 91192
Dellacorte, C. 91106, 91107, 91162
Denkena, B. 91150
Derbyshire, R. L. 91147
DeVore, C. E. 91061
Didziulis, S. V. 91176
Dowdle, W. R. 91129
Duda, J. L. 91052, 91142
Dugger, M. T. 91177
Dunaevsky, V. V. 91042
Dwyer, S. R. 91064

E

Eberhardt, A. W. 91182, 91154, 91172
Erck, R. A. 91088, 91095, 91138, 91151, 91159
Erdemir, A. 91088, 91094, 91095, 91151, 91159
Esfahanian, M. 91080
Eshel, A. 91072
Etsion, I. 91136
Evans, W. A. 91118
Ezugwu, E. O. 91148

F

Farris, T. N. 91022
Feehan, J. P. 91181
Fein, R. S. 91169
Fenske, G. R. 91088, 91095, 91138, 91151, 91159
Fine, M. E. 91186
Firko, H. T. 91125
Fleischauer, P. D. 91176
Flom, D. G. 91090, 91091
Fuitz, G. W. 91164
Furuhama, S. 91012

G

Gangopadhyay, A. 91033
Gates, R. S. 91051
Giffrow, M. 91124
Godfrey, D. 91104
Goto, T. 91130
Gozdawa, T. J. 91065
Graham, E. E. 91098, 91114
Green, I. 91023, 91102
Groeneweg, M. 91173
Gschwender, L. J. 91164, 91191
Gupta, P. K. 91001, 91013
Gupta, V. K. 91154, 91172

H

Hadley, J. W. 91115
Haggett, R. D. 91165
Hahn, G. T. 91178
Haizuka, S. 91020
Hajcsar, E. E. 91129
Hakim, N. 91173
Hamai, K. 91130
Hamrock, B. J. 91080, 91188
Han, X-A. 91155
Harangozo, A. V. 91065
Harari, N. 91136
Harkness, D. M. 91126
Harnoy, A. 91043
Hashimoto, H. 91014
Heenan, D. F. 91129
Heinrich, J. 91112
Hendricks, R. C. 91010
Hendriks, F. 91069
Herrmann, D. K. 91123
Heshmat, H. 91024, 91053, 91060
Hildebrant, K. A. 91166
Hilton, M. R. 91176
Hiltz, J. A. 91165
Hirabayashi, H. 91029, 91063, 91137, 91158
Holzhauer, W. 91044
Hombek, R. 91092, 91119
Homma, Y. 91097, 91171
Hoult, D. P. 91054, 91111
Hsu, S. M. 91051, 91085, 91086, 91183
Hu, R. 91151
Huang, C. 91110
Huckabee, M. L. 91068

I

Ichimaru, K. 91179
Igarashi, J. 91007
Insolia, G. 91102
Ishikawa, H. 91012
Ito, M. 91137
Itoh, M. 91029
Itoh, Y. 91171

J

Jackson, A. 91156
Jafry, S. 91117
Jahanmir, S. 91033
Jain, S. C. 91057
Januszkiewicz, K. R. 91092, 91119
Jen, C-W. 91135
Jha, V. K. 91016
Jiang, B. C. 91045
Johnson, R. P. 91002
Johnston, G. J. 91025
Jung, S. Y. 91046, 91047

K

Kai, S. 91130
Kaneta, M. 91158, 91179
Kawamura, M. 91056
Kawasaki, M. 91127, 91153
Kawashima, K. 91171
Kaymaram, F. 91078
Keer, L. M. 91182
Keith, T. G. Jr. 91005
Kennedy, F. E. Jr. 91040, 91048, 91181
Key, W. E. 91108
Khanna, V. D. 91069
Kipp, E. M. 91084, 91168
Kirk, T. E. 91084
Kita, T. 91015
Kitamura, K. 91056
Klaus, E. E. 91052, 91142, 91173
Koga, T. 91029, 91137
Komatsuzaki, S. 91097, 91171
Komiya, M. 91158
Komvopoulos, K. 91034, 91035
Kong, H. S. 91073
Kumar, R. 91099
Kushwaha, R. L. 91100
Kussi, S. 91163
Kyogoku, K. 91189

L

Lacey, P. I. 91183
Landis, M. E. 91133
Lankford, J. 91185
Lashen, E. S. 91083
Latto, B. 91120
Lauer, J. L. 91064
Lauzon, D. C. 91129
Law, A. B. 91083
Lee, M. 91090, 91091
Lee, P. H. 91181
Lee, R. H. 91086, 91151, 91159
Lee, S. C. 91190
Lee, S. W. 91183
Leefe, S. E. 91077
Lim, D. S. 91085
Lim, S. G. 91026
Lince, J. R. 91176
Lipschitz, A. 91002
Liu, J. J. 91003
Liu, P. P. 91045
Liu, W. 91110
Lu, S. S. 91008
Lucca, D. A. 91037
Lux, J. P. 91111

M

Maayan, M. 91048
Machado, A. R. 91148
Mahdi, S. M. 91143
Maher, J. F. 91075
Makki, J. 91098
Malik, M. 91009
Manning, F. E. 91108
Marano, R. S. 91113
Marcsik, J. R. 91114
Marscher, W. D. 91055
Masuda, T. 91130
Matteo, N. J. 91134
Matthews, J. J. 91117
Matumoto, H. 91189
McClung, W. D. Jr. 91074

Melley, R. E. 91149
Melodick, T. E. 91036
Miller, N. C. 91170
Ming, N. 91087
Mitchell, G. E. 91192
Miyazawa, M. 91158
Miyoshi, K. 91174
Mizerka, L. J. 91027
Movahed, B. Z. 91096
Moyer, C. A. 91180
Munro, R. G. 91085, 91066
Murakami, T. 91028
Murakami, Y. 91179
Murphy, W. R. 91133

N

Nakahara, T. 91189
Nakajima, T. 91063
Nakama, N. 91029
Nakamura, M. 91189
Naruse, C. 91020
Nau, B. S. 91077
Namoto, R. 91020
Nguyen, S. H. 91070
Nichols, F. A. 91088, 91095, 91151

O

Ohmori, T. 91056
Olechowski, M. J. 91111

P

Page, R. A. 91185
Paige, H. L. 91123
Palmor, Z. J. 91136
Papay, A. G. 91103
Pashby, I. R. 91148
Pearson, P. K. 91157
Peebles, D. E. 91175
Pierce, D. E. 91027
Pope, L. E. 91175
Prahl, J. M. 91026
Prashad, H. 91079
Pucciani, A. J. 91114

Q

Qiu, C-W. 91087
Quitmeyer, J. 91093

R

Rabinowicz, E. 91078
Raffa, F. A. 91011
Rai, A. K. 91058
Rajalingham, C. 91016
Rehn, L. E. 91151
Riddle, B. L. 91084, 91168
Rigaut, B. 91128
Rivera, M. P. 91017
Roby, S. H. 91116
Rodes, C. 91122
Rogers, R. J. 91038
Rosenfelder, O. 91112
Rothschild, W. 91177
Rozeanu, L. 91048
Rubin, C. A. 91178
Rush, R. E. 91061, 91152

S

Sachs, N. W. 91160, 91167
Sadeghi, F. 91074
Sakae, C. 91179
Sakai, T. 91028, 91153
Salant, R. F. 91018
Sampath, W. S. 91109
San Andres, L. A. 91046, 91047, 91066
Sasaki, A. 91127, 91153
Schelter, H. 91112
Schödel, U. F. 91121
Sen, A. K. 91099
Sharma, S. C. 91057
Shen, M. C. 91190
Shi, J. 91100
Shimomura, T. 91083
Shiomi, S. 91029, 91137
Sinhasan, R. 91057
Sköld, R. O. 91140, 91143
Slack, D. A. 91166
Sliney, H. E. 91106, 91107
Snyder, C. E. Jr. 91123, 91164, 91191
Sorab, J. 91076
Spikes, H. A. 91025, 91032
Sproul, W. D. 91050
Stolarski, T. A. 91065
Sulek, H. H. 91092, 91119
Suzuki, M. 91012

T

Takiguchi, M. 91054
Tanoue, H. 91029, 91137, 91158
Tichy, J. 91062
Tobisu, T. 91127, 91153
Tolfa, J. C. 91105
Tönshoff, H. K. 91131, 91150
Tripp, H. A. 91036
Tsuboi, H. 91137
Tung, S. C. 91004, 91006, 91059

U

Uchibori, Z. 91158
Uchiyama, S. 91127, 91153
Ura, A. 91137

V

Vaidyanathan, K. 91005
Van Pelt, S. G. 91157
Vanarsdale, W. E. 91076
Vance, J. M. 91046, 91047
Vassel, A. 91122
Vatta, F. 91011
Venier, C. G. 91132

W

Wahl, K. J. 91177
Wallbank, J. 91148
Walton, J. F. 91060
Wang, H. 91110
Wang, J. 91019
Wang, L. 91109
Wang, S. H. 91019
Wang, S. S. 91004, 91006, 91059
Wang, Y. S. 91085, 91086, 91183
Warren, O. L. 91154
Watanabe, T. 91012
Wayne, S. F. 91068
Wayte, R. 91025
Wedeven, L. D. 91170, 91187
Wei, R. 91109
Wilbur, P. J. 91109
Wilcock, D. F. 91139
Williamson, D. L. 91109
Willingham, G. L. 91147
Wobker, H-G. 91131
Wright, R. N. 91037
Wu, S. 91049
Wu, W-T. 91142

X

Xue, Q. 91110

Y

Yamamoto, Y. 91028
Yang, J. 91120
Yasuda, Y. 91189
Yoshida, T. 91007
Yoshizaki, M. 91020
You, H. I. 91008
Yu, S. 91038
Yust, C. S. 91061

Z

Zang, Z-Y. 91155
Zhang, B. 91110
Zhang, H. H. 91019
Zhang, X. 91110
Zhang, X. H. 91003
Zhu, B. L. 91003
Zhu, H. 91043